

Oliver Stewart
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Recommendation Handling



10 February 2020

Mr Andrew Hall
Deputy Chief Inspector of Rail Accidents
Cullen House
Berkshire Copse Rd
Aldershot
Hampshire GU11 2HP

Dear Andrew,

RAIB Report: Derailment at Bletchley Junction, Bletchley on 3 February 2012

I write to provide an update¹ on the action taken in respect of recommendation 2 addressed to ORR in the above report, published on 21 November 2012.

The annex to this letter provides details of the action taken regarding the recommendation. The status of recommendation 2 is **'implemented'**.

We do not propose to take any further action in respect of the recommendation, unless we become aware that any of the information provided has become inaccurate, in which case I will write to you again.

We will publish this response on the ORR website on 11 February 2020.

Yours sincerely,

Oliver Stewart

¹ In accordance with Regulation 12(2)(b) of the Railways (Accident Investigation and Reporting) Regulations 2005

Recommendation 2

The intention of the recommendation is that, at potentially high risk diverging junctions, such as those where the approach speed is 60 mph (96 km/h) or greater and requiring a reduction in speed of a third or more, the risk from a train over-speeding on a diverging route following the clearance of the junction signal under approach control conditions is reduced. Different or additional mitigation may be justified depending on the level of risk identified; this may include replacement by position light junction indicators; replacement of junction indicator by one in modern equivalent form; alteration to signalling controls etc.

Network Rail, in conjunction with train operators, should assess the risk from over-speeding at potentially high risk diverging junctions with approach control following the clearance of the junction signal.

As a minimum, the scope should include consideration of:

- Junctions where the speed of the diverging route is significantly lower than the approach speed;
- Junction signals fitted with standard alphanumeric route indicators; and
- The type of traction using the junction and its ability to accelerate following the clearance of the junction signal from red.

The outcome of the risk assessments should be used to determine whether different/additional mitigation is required.

1. We wrote to you in October 2013 outlining Network Rail's proposed actions to address this recommendation:
 - a. Part 1 would review of the impact of the recommendation on a sample part of the infrastructure (West Coast South) and assess its impact; and
 - b. Part 2 would review this assessment and determine the reasonably practicability of the proposal for national implementation.
2. In May 2016 we wrote to you to explain that we had received the outcomes of Network Rail's risk assessment exercise for junction signals on the southern half of West Coast mainline. We were not satisfied that Network Rail had yet demonstrated that it had addressed all elements of the RAIB recommendation suitably and sufficiently.
3. Since we last wrote there have been several exchanges of information between ORR and Network Rail to try to demonstrate that the industry has reached a point where there is no further reasonably practicable action that has been identified.
4. The documents in Appendix A show the additional information provided by Network Rail in March 2016, which amplified the work already carried out

to show how specific 'Bletchley issues' had been addressed as well as conventional SPAD considerations.

5. Network Rail's submission of March 2016 also made two significant claims:

- a) That, even if more locations had been identified, they had identified no reasonably practicable solutions to control or mitigate the risks in any case
- b) That so few locations had been identified – at so much time and trouble – that it was not worth continuing the assessment methodology for the rest of the network.

6. In light of these opinions, Network Rail proposed doing nothing further in relation to Bletchley recommendation 2. We asked Network Rail to provide more information to justify this conclusion.

7. We reported to RAIB in May 2016 (Appendix B) that we had received the assessments but were not yet satisfied that the results were suitable and sufficient and had written to ask Network Rail for more details.

8. NR's initial response to this request was the closure submission at appendix C, received in June 2016. This does no more than re-state the March 2016 conclusions at slightly greater length. We pushed for more.

9. In response we received, firstly, a document collating the views of a number of signal engineers within Network Rail about the issues highlighted by the overspeeding event at Bletchley and possible remedies. It can be found at appendix D. This can be summarised thus:

- a) "The fundamental problem is that we have applied junction signalling controls to "try" and manage the speed of the train using a system which is not designed to be a speed signalling system".
- b) All efforts to manage this risk are compromised due to the constraints of running such mixed traffic on the network – with variable lengths, weights and braking capacity of rolling stock. All signalling has to adopt a one-size-fits-all/worst-case-scenario set of assumptions.
- c) Efforts to improve speed supervision, such as adopting approach release controls, or changing TPWS settings, can have performance or other safety consequences.
- d) The truly effective solution will come with ETCS or other in-cab speed supervision systems and there is nothing reasonably practicable in the interim.
- e) RSSB work on signal provision, layout and spacing will provide consistent advice to designers for future junction signal design.

10. We discussed these findings with ORR asset management engineering colleagues, who were sympathetic to the conclusions.

11. Additionally – following ORR challenge that Network Rail needed to demonstrate that it had carried out at least a high level review of the rest of the network – in August 2016 it provided the information in appendix E. This records the findings of a session where route-based signal engineering staff discussed their locations with the Professional Head of signalling and operations staff.

12. This showed that the locations judged to be the highest risk ones already had additional mitigation of approach release controls and/or flashing aspects. No further reasonably practicable mitigations were identified by this work.

13. **By the end of 2016 ORR had reached a point where it accepted that there was no reasonably practicable additional mitigation that could be introduced at the relatively small number of locations with ‘Bletchley-like’ characteristics.** All that remained was to confirm that the physical works to remodel Bletchley junction had been carried out.

14. However – ORR noted that some of the work planned in relation to Didcot SPAD RAIB recommendation 2 was relevant to Bletchley. Network Rail had committed in its response to this recommendation to carry out a full cycle of ‘SORAT’ (Signal Over Run Assessment Tool) assessments for junction signals.

15. The SORAT assessment had been refined from its inception to become more sophisticated - requiring actual braking performance of trains at junctions to be taken into account using outcome modelling against a range of possible mitigations including TPWS, ATP, train stops, ERTMS etc.

16. Network Rail confirmed at a meeting on 18 October 2018 that Bletchley junction has been remodelled, effectively engineering out the risk that led to the initial incident.

17. Following a request for an extension to the timescale to complete the full cycle of SORAT assessments, Network Rail reported to us in April 2019 that the five year review cycle has been completed for all junction signals and each route now has an action plan for any gaps in provision which were identified.

18. It is ORR’s view that these SORAT assessments provide more comprehensive assurance that a range of risks at junction locations have been considered than the high-level review described in appendix E.

19. ORR is proposing to carry out assurance work to sample SORAT assessments and resulting action plans.

20. Potentially significant operational benefits associated with ETCS and the Digital Railway are on the horizon and ultimately that is likely to be the reasonably practicable control for this risk. We would expect Network Rail to

consider the important safety learning from this report and recommendation when introducing ETCS.

21. **In summary:**

- Network Rail carried out detailed assessment as described in the RAIB recommendation for the southern end of West Coast Mainline. The results did not justify repeating this approach for the whole network.
- ORR pushed Network Rail to do more to justify its conclusion that there were no reasonably practicable solutions at locations with similar characteristics to Bletchley. It did this.
- ORR asked for a better demonstration that there were not other locations on the network where the risk of over-speeding had not been considered adequately.
- It did this initially with a simple peer-review workshop. Subsequently, all junction signals have been subject to detailed SORAT assessments.
- Bletchley junction has been remodelled.

22. After reviewing the information provided ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:

- taken the recommendation into consideration; and
- taken action to implement it

Appendix A - information from Network Rail March 2016

23. On 2 March 2016 Network Rail provided the following closure statement for recommendation 2:

The agreed actions for the recommendation at Bletchley were as follows -

- *Network Rail to take the work that Virgin Trains have undertaken along the line of route (LNW South), identifying where similar layouts and indications currently exist.*
- *Network Rail and Virgin Trains to examine these initial locations and to check the signal sighting details, any Signal Passed at Danger (SPAD) history, any reports of poor sighting and any other safety issues or reported details relevant to the location(s).*
- *Network Rail and industry to identify any issues for the respective signals and undertake a suitable risk assessment if required for any potential mitigation.*
- *Network Rail and Industry to consider other locations nationally where similarities exist to the layout at Bletchley and undertake the work outlined above.*

In order to progress this, Virgin Trains has produced a simple table [Annex B] identifying locations where a Bletchley type over speed risk are.

This is a simple location and speed table and does not include signals. It also covers all potential locations on the Virgin line of route. Initially Network Rail has decided to concentrate on the West Coast South from Northampton to Euston. It has taken this a step further to look at the signals that are directly affected by this, then to look at these signals to see if any are of the same type as Bletchley (approach control + theatre indicator). The signals identified are on the enhanced simplifier, giving signal numbers. Several reports have been run to look at all of the signals identified, including Cat 'A' SPADS, Train Protection Warning System (TPWS) event and signal defects. After analysing these reports, the following was found:

- *Cat 'A' SPADS - 19 events*
- *TPWS Track Events (2007-2010) -15*
- *TPWS Track Events (2010- 2014) - 49*
- *Defects - 15 events*

SPAD

From the above info, we have looked at the text around the events and identified similarities to Bletchley in 4 Cat 'A' SPAD's. This is captured in the table below.

EVENT_DATE	SIGNALBOX_DESC	SIGNAL_NUMBER	LOCATION_DESC	TRAIN_COMPANY_NAME	TRACTION_IDENTIFIER	OVERRIDE_YDS	OVERLAP_YDS	SIGNAL_TOTAL_SPADS	PREVIOUS_SPAD_DATE	DRIVER_NUMBER_SPADS	TPWS FITTED AT SPAD SIGNAL IND	ERROR_CATEGORY_DESC
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28/05/199	3 02:10 Rugby	RY1038	Northampton	London Midland	321431	240	20	1		2	N	Failure to check signal aspect
15/02/199	4 08:50 Watford Jn	WJ759	Watford South Jn	London Midland	321411	48	160	1		1	N	Failure to check signal aspect
04/07/199	6 17:11 Watford Jn	WJ759	Watford South Jn	London Midland	321409	54	160	4	16/08/1995	1	N	Failure to locate signal
25/05/199	9 07:18 Wembley Mainline	WM324/W154	Kilburn High Road	Freightliner	90143	70	200	1		3	N	Failure to locate signal

This information highlights the fact that Network Rail has not had a SPAD event at any of these signals since 1999, and of the 4, there are no similar train characteristics to Bletchley aside of the class 90 at Wembley, but this was a complete train and not a light engine. Also, none of these signals are of a theatre indicator type. The assessment details for RY1038 are provided along with the following statement – ‘This signal has a risk banding of J4 or 0.0000019399 FWI and as such Network Rail wouldn’t recommend any further action to be taken on this signal)’.

Standard Assessment
RY1038.pdf

TPWS

From the above info, Network Rail has looked at the text around the events and identified similarities to Bletchley in 8 TPWS events, captured in the table below:

Event Date	SMIS Ref.	Location	Signal Number	Interested	Short Description
02/06/2011	HLM/020611/034	Northampton Mill Lane Jn	RY1036	Yes	2Y14 - TPWS Activation - Too high speed
03/06/2011	QNW/2011/JUN/84	Bushey	WJ759	Yes	2J47 had a TPWS activation at signal WJ759 - Too high speed Approach control
07/11/2012	DWS/2012/NOV/47934	Watford South Jn	WJ759	Yes	Cat A Spad for DBS 7M53 05:10 Acton to Watford at signal WJ759. – loss of concentration
14/03/2013	DWS/2013/MAR/48569	Wembley Central (WCML)	WM338	Yes	CAT A SPAD - DBS 6R60 21:45 Bescot to Camden passed signal WM336 at Sudbury Junction, Wembley, by 60 mtrs.due to reading incorrect signal.
14/07/2013	HSL/2013/1946	Watford Jn (DC Lines)	WJ759	yes	TPWS - appr WJ759 @ RED - u377213 - 47mph/46mph - too high speed
27/07/2013	HLM/270713/032	Hillmorton	KR3345	yes	1U37 - TPWS Activation for KR3345 signal due to overspeed. - too high speed
01/09/2013	HWC/2013/SEP/1366	Northampton	RY1052	yes	1B90 had TPWS against Red at Northampton, signal RY1052. Set 390047, veh 69147 - too high speed
20/07/2009	HLM/200709/6027	London North West	RY1052	yes	1U36 - TPWS Activation - too high speed

This information shows that Network Rail has 2 Cat 'A' SPADS listed as TPWS events in SMIS. This is being looked at separately by the safety










team. These 2 events do not show any similarities to Bletchley due to being freight trains hauled by diesel locomotives and reasons being loss of concentration and reading an incorrect signal.




For the TPWS events, these all show travelling too fast and caught by the OSS, again no similarities to Bletchley.









In line with the agreed action plan for this recommendation, Network Rail has looked at the section of line from Northampton to Euston on the West Coast South Route, with a view to seeing if any other signals pose the same kind of risk as the Bletchley incident. From the information it has available, and analysing events at locations where a reduction in speed is necessary, it has not found any similar signals or previous incidents to the one at Bletchley.

With this information, and the findings as such, Network Rail does not believe that any further work is required outside of the locations checked to see if any similarities exist. The information it has gathered does not indicate that this is a common problem, and it has also asked Virgin Trains to share the over speed risk paperwork with other operators on the West Coast as a Good Practice guide.

LOCATION SIMPLIFIER OF BLETCHLEY TYPE OVERSPEED RISK

	<i>Location</i>	<i>Route, or Lowest speed at Junction</i>	<i>Lowest speed</i>	<i>Signals</i>
<i>Euston to Preston (inc. Northampton)</i>				
1.	Kilburn AND West London Junction	<i>Lowest Junction Speeds identified as 15 Mph</i>		WM323 WM723 WM324
2.	Willesden North Junction	<i>Lowest Junction Speeds identified as 30 Mph</i>		WM127 WM331 WM126 WM330
3.	Wembley Central	<i>Lowest Junction Speeds identified as 10 Mph.</i>		WM338 WM392
4.	Watford South Junction	<i>Lowest Junction Speeds identified as 15 Mph</i>		WJ759
5.	Kings Langley	<i>Route from Up Slow to UGL.</i>		WJ74
6.	Tring North Junction	<i>Lowest Junction Speed identified as 25 Mph.</i>		TK5173 TK9877 TK3172 TK5174
7.	Denbigh Hall North Junction	<i>Lowest Junction Speed identified as 30 Mph</i>		TK5231 TK9753 TK3230
8.	Northampton Mill Lane Junction	<i>Lowest Junction Speed identified as 25 Mph</i>		RY1052 RY1049 NL5448
9.	Northampton North Junction	<i>Lowest Junction Speed identified as 20 Mph</i>		RY1038 RY1036 RY1030 RY1029 RY1031

10.	Rugby South Junction	Route identified at 40 Mph from the Down Main to the Down Slow		KR3345
11.	Rugby North Junction	Route identified at 40 Mph from the Down Slow to the Down Fast		RN5368
12.	Nuneaton North Junction	Routes identified at 25 Mph from the UTS to the DTF		

	<i>Location</i>	<i>Route, or Lowest speed at Junction</i>	<i>Lowest speed</i>
1.	Crewe South Junction	Routes from CE105 and CE107 can be from a Theatre type indicator for routes at 20 Mph or 15 Mph into the Bays.	
2.	Crewe North Junction	Routes from CE144 and CE146 can be from a Theatre type indicator for routes at 20 Mph or 15 Mph into the Bays.	
3.	Wigan NW North Junction	Routes from WN11 at 10 Mph from the UM to the UPL and DPL.	
4.	Preston Ribble Junction	Alternate routes available when departing Preston are via 30 Mph crossovers.	
West Midlands area			
5.	Coventry Station area	Routes around Coventry station area.	
6.	Proof house Junction to Birmingham New Street	Routes approaching Birmingham New Street Down Stour NS154 to Up Stour X route.	
7.	Perry Bar and Soho Junctions	Routes around Perry Bar and Soho Junctions.	
Derby Lines			
8.	Landor Street and Washwood Heath West Junction	Routes around the Landor Street and Washwood Heath West Junctions at 15 Mph. Some routes have speed reductions without Warning boards 45 Mph to 15 Mph.	

Appendix B – second stage of information from NR and report to RAIB

Previously reported to RAIB on 25 May 2016

ORR Decision

24. ORR has sought from Network Rail additional information relating to the risk assessments carried out on West Coast Main Line (WCML). ORR judges that, although thorough in considering conventional SPAD risk, the assessments undertaken to date do not, in all cases, address the specific likelihood and consequences of overspeeding at diverging junctions. Whilst the outcome of discussions with Network Rail suggests that it will be very difficult to provide the additional mitigation envisaged by this recommendation, ORR considers that Network Rail needs to submit additional evidence to justify this conclusion. ORR has received some material explaining the constraints ruling out reasonably practicable solutions – but these do not yet provide a wholly satisfactory rationale.

25. After reviewing information received ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:

- taken the recommendation into consideration; and
- taking action to implement it, but has yet to provide sufficient justification to allow closure.

***Status: Progressing.* ORR will advise RAIB when further information is available regarding actions being taken to fully address this recommendation.**

Appendix C – On 14 June 2016, Network Rail provided the following closure statement:

1.0 Background

Network Rail received RAIB Recommendation 2 following a derailment at Bletchley Junction on 03 February 2012. This recommendation required:

Network Rail, in conjunction with train operators, should assess the risk from overspeeding at potentially high risk diverging junctions with approach control following the clearance of the junction signal. As a minimum, the scope should include consideration of:

- junctions where the speed of the diverging route is significantly lower than the approach speed;*
- junction signals fitted with standard alphanumeric route indicators; and*
- the type of traction using the junction and its ability to accelerate following the clearance of the junction signal from red.*

The outcome of the risk assessments should be used to determine whether different/additional mitigation is required.

A closure statement was submitted but additional information was requested to formally close this recommendation with RAIB.

2.0 Work Previously Submitted

A detailed risk assessment was completed on the West Coast South Route covering locations with Theatre Indicators. This work identified that although there were other locations similar to Bletchley none of them had the same characteristics and train movements as Bletchley Junction. This addressed the first three points of the agreed action plan for Bletchley:

- 2.1 Network Rail to take the work that Virgin Trains have undertaken along the line of route (LNW South), identifying where similar layouts and indications currently exist.*
- 2.2 Network Rail and Virgin Trains to examine these initial locations and to check the signal sighting details, any SPAD history, any reports of poor sighting and any other safety issues or reported details relevant to the location(s).*
- 2.3 Network Rail and industry to identify any issues for the respective signals and undertake a suitable risk assessment if required for any potential mitigation.*
- 2.4 Network Rail and Industry to consider other locations nationally where similarities exist to the layout at Bletchley and undertake the work outlined above.*

The remaining point was the 2.4 which this paper and the subsequent work will address.

3.0 Additional Closure information

The initial work identified that there were no locations of a similar nature to Bletchley that pose the same risk. In order to satisfy the final part of the action plan it was agreed with the ORR to identify locations similar to Bletchley from across the rail network.

This additional work did not identify any additional locations with the same characteristics as Bletchley. The information was supplied to the ORR and following a discussion about the results it was agreed that there would be no benefit from pursuing the detailed risk assessment process for these locations. It was also identified from the West Coast South assessment and the cross country sense check that there are no locations that justify pursuing very expensive but in effective solutions.

The initial work along with the additional check has highlighted that there are no reasonably practicable mitigations that could be applied. There is no consensus within Network Rail or across the rail industry whether any additional or alternative methods could reasonably be applied. The limitations of TPWS speed control and the inability to incorporate speed control into conventional signalling systems make these mitigations ineffective. The benefits future speed based signalling systems offer will mitigate against these types of events in the future.

Should affordable additional controls be identified by industry research and advancement in technology the issue will be revisited by Network Rail

4.0 Conclusion

From the output from the initial risk assessment and the subsequent nationwide check it has been concluded that Network Rail carried all the work that can be reasonably expected. The conclusion is that, so far as is reasonably practicable, the risks have been assessed and no further work is required in this area.

Appendix D Network Rail Signalling Professionals' discussions of reasonably practicable solutions/risk controls July 2016

26. Network Rail provided some feedback from their signalling engineers which developed the context around incident of this type and explored possible mitigations:

Junction signalling has been a challenging subject for some time, particularly as the speed of divergences has increased and with the pressure to improve performance.

It has been divided into two main forms – approach release from red and “free/restricted” aspects.

Approach release from red dates back to semaphore days where junction speeds were generally low and it was appropriate to bring the train to a stand, or almost to a stand, before clearing the signal to provide assurance that the train would not overspeed through the junction. With “theatre” style indicators having limited readability (i.e. the distance where the driver could correctly discern the displayed character), the use of approach release from red matched the use of these indicators. As time has moved on the speed of divergences has increased but it has not always been possible to adopt a free/restricted aspect and the approach release from red has become an operational burden and led to a secondary safety risk of a SPAD (driver anticipating the signal will clear and then it does not). Freight drivers have been particularly vociferous since stopping a heavy train, sometimes on an adverse gradient, and then restarting is not easy or environmentally friendly.

Free/restricted aspect sequences have been used either where the divergence speed is close to the line speed (risk of derailment if the driver does not slow the train) or where the driver gets advance notice of the divergence (flashing aspects or splitting distants) enabling them to manage the train speed. However these divergences generally need to be associated with position light junction indicators which have a much greater readable distance than theatre style indicators and consideration needs to be given to the destination – a position light junction indicator into a bay platform has not been considered acceptable.

Where the use of a theatre and approach release from red would lead to serious performance issues and a case can be made, then a restricted aspect with a theatre has been applied (the argument generally being that the fact the theatre is lit is visible from a longer distance than it is readable, the junction signal is restricted to a caution aspect and the location of the divergence is sufficiently far from the junction signal for the driver to correct the speed (if necessary) before reaching the divergence).

We have also encountered locations where the restricted aspect sequences (e.g. flashing aspects) for one junction would overlap with another. The risk here is that the driver becomes confused as to which junction the aspects apply to and if the speeds are different then there is a risk of overspeed.

TPWS has been considered but there are problems with supervising speed (as we encountered with PSRs) in that the single separation of the loops on the track is evaluated as two set speeds depending on the brake setting of the train – a freight train treats the loops as having a set speed around 75% of the passenger train. This means that in order to ensure a passenger train is braking there is a risk that a freight train is tripped unnecessarily and if you avoid the freight train trip then the passenger set speed becomes ineffective.

The fundamental problem is that we have applied junction signalling controls to “try” and manage the speed of the train using a system which is not designed to be a speed signalling system,

John Alexander – Principal Engineer

Struggling a bit to add anything meaningful to what JA has to say as he has covered most of it.

A fundamental point though is that attempting to provide speed signalling with a system of aspects based around route signalling just doesn't work universally. This is obviously worse in more complex and higher speed areas where separation of sequences can be tricky.

Likewise, with the best will in the world, TPWS is not ATP and many of the clever things we have done with it like TPWS+ are a happy accident and not universally applicable.

The other thing I have observed is that there is no consensus as to how junctions are best signalled and there are a whole range of opinions between RSSB, NR, TOCs and FOCs. This means getting network change can be an exercise in opinion management and standard interpretation. Opinion also changes, hence the huge diversity in principles across the network.

What we need is ETCS.

Jerry Morling – Head of Signalling

I have had a look back at the Bletchley rec, and what the issue identified is.

As John suggests we have developed and refined junction signalling control over the years, but the one thing that has not changed is that what we are attempting to do. All the controls are designed to allow a driver on 'reading' a signal to determine the route that has been set and hence the speed. Signage has been provided to assist with speed knowledge but main identifier is the Route Indicator.

To cover off the items you mention below –

- As I think the Bletchley incident shows, it is not the control that had an impact on the train speed. The driver had controlled the speed of the train as envisaged by the system – but was able to defeat it - and so more intrusive (interlocking controls) I do not think are appropriate.
- TPWS is effective as a SPAD mitigation tool, but due to our mixed traffic railway and limited 'checks' that would be done on speed it is not very effective at speed management. That said at 'high risk sites' it may be possible to install loops on the approach to S&C that would act to control speed or at least enforce in drivers knowledge that if they do not control the speed they will be tripped. I feel this would work more like a speed camera and change driver behaviour rather than mitigate the train speed directly.
- Signalling principles – I would assume that the principle we need to review would be choice of indication. Our current principle is that PLJI are preferred over Standard indicators, so I do not believe that a change in this would be required. We may wish to consider places that we restrict the use of PLJI, into Bays and some complex areas if we consider that PLJI is a more readable junction indicator. It may be that for some High risk areas a 'New' indicator would be more readable? This development would take a large amount of effort, but with modern indicators, it may be possible to have active Speed signs? (just an idea!)
- Approach locking, I assume we mean approach control. This has changed over time, but the approach control is used to give assurance that the aspect displayed can be read. Any amendment to approach control that would 'measure/check' speed will have all the same issues that TPWS will have with differing train performance.
- Flashing Aspect – this is a way of giving advanced info about the junction ahead. Speed information is only given to the driver by the signage, and route knowledge is all that confirms the speed required.

All option for improvement move us away from a route based system, to a speed based one. If we are concerned that Drivers route knowledge cannot be relied upon, I would move to a more active display or route to remind drivers of locations etc. This for me would be when a DAS type cab display that can assist in reminding drivers of the route info in the cab. Bit like a TOMTOM!!

If speeding is an issue, and we can't wait for ETCS, then a speed supervision system (like TASS) may be needed. As trains become fitted with ETCS ready, then this speed supervision may be more practical. I thought this was what the 'limited supervision' work done by RSSB would/did look at?

So after the ramble, what is the simple paragraph (maybe)

The use of PLJI is the indicator of choice now on Network Rail, Standard indicators are only used if PLJI is not practical. Eg limited space, improved sighting, etc. As interlockings are renewed/replaced, a review of junction signal controls is made, and control aligned to modern principles if no change to external equipment is required.

More intrusive signalling design would have a significant cost, with a simple change costing a minimum of about £25k(my estimate!). Amendment to controls would require assessment of risks and as all would be reliant on the reading the signal, this would be area of most work.

Additional TPWS as a mitigations is not robust a managing speed, but could be fitted to assist is changing driver behaviour to high risk locations. A typical TPWS fitment would cost £10-15k but as we will require switching it can be expected to be slightly higher.

RSSB have started work on a project to review the provision and layout of signals, this work may need to be extended to cover new option for indications of route and layout of signals. This arrangement would require industry acceptance and industry briefing. This would need to consider the impact on current equipment, and not undermine existing controls.

Sorry a bit of a ramble, but I think the answer is with a route based system we rely on driver training to control and understand speeds to be driven. In the same was as SPAD risk has been managed and enforced by Professional driving Speed needs to be next on the agenda.

Pete Evans Signalling Engineer

Appendix E – Network Rail peer-review of locations that could have ‘Bletchley’ over-speed potential

27. Following a level 1 safety meeting between Network Rail and ORR, on 12 August 2016 Network Rail provided the following additional information:

Question to the Operations Managers

I met with the ORR for a level 1 safety meeting yesterday and during the discussion they raised the Bletchley Recommendation and how this can be closed in their system. We have shut down with Network Rail after completing the work that is reasonable but the ORR have asked for some additional information. They need:

- 1. The number of diverging junctions with approach release from red with alpha or numeric theatre indicators. (High Speed Lines)*
- 2. Where are these locations in the network, Routes or Areas would be sufficient.*
- 3. How many of these locations are on high speed lines and where are they.*
- 4. At any of the locations on high speed lines are any of them a significant distance from the junction that will allow a train to pick up a significant amount of speed.*
- 5. Are these locations used for regular light loco moves?*

Responses

<i>Name</i>	<i>Route</i>	<i>Response</i>
<i>Tom Brooke</i>	<i>LNE South</i>	<i>I have none of these on my area LNE South (Kings Cross to Heck, incorporating Kings Cross, Peterborough and Doncaster PSBs).</i>
<i>Adam Flint</i>	<i>Anglia N&ELL</i>	<i>Just to confirm, we don't have any of these junctions on the North or East London lines.</i>
<i>Kenny Blythe</i>	<i>Scotland East</i>	<i>OM Edinburgh area Approach Controlled Signals: 42 Approach controlled signals with Alpha Numeric Theatre indications on High Speed Lines: 0</i>
<i>Jim Mansfield</i>	<i>LNE - Worksop</i>	<i>My Team and I have reviewed the OM Sheffield Area and have no situations which meet the criteria below.</i>
<i>Paul Owen</i>	<i>LNW Cumbrian</i>	<i>We have numerous Theatre Indications in the Carlisle station area but would certainly not classify this as a “High Speed “line. On the High Speed area of the panel we have feather or flashing yellow indications.</i>
<i>Joseph Davison</i>	<i>LNE Tyneside</i>	<i>M Robson (Tyneside LOM) has asked me to have a look at this for you.</i>

		<p>We have a number of signals with track approach but the majority have feathers on.</p> <p>We have a couple with theatre indicators on.</p> <p>T866 on the up main at Darlington (LN600 ECM5), which is not a significant distance from the junction and has no regular light loco move.</p> <p>T544 on the up main at Manors station (LN600 ECM7), which is not a significant distance from the junction and has no regular light loco move.</p>
Steve Houlston	LNE - Leeds	<p>I can think of two: Approach controlled.</p> <p>Northallerton: Down Fast (125 mph) to Down Eaglescliffe (25 mph) from Y467.</p> <p>Hare Park Junc: Down Doncaster (100 mph) to Down Crofton (25 mph) from L263</p>
Dale Coupland	Barnetby	<p>We have a number of these signals, but not on what we would class as "high speed" (max 55mph). Do you require these ?</p>
Karl Grewar	Wessex	<p>Wessex hasn't got any high speed lines as such. We have one stretch of 100mph running line between Basingstoke and Winchester – and there are no diverging junctions within this stretch.</p>
Simon Ponter	Western – West Country North	<p>None on West Country north</p>
Juwad Nasir	Anglia	<p>On Anglia we do not have any high speed junctions. There are no locations where a light loco could reach a junction at excessive speed after passing an approach controlled alpha/numeric theatre indicator</p>
Glenn Missons	HS1	<p>We don't have any diverging junctions with approach release from Red in high speed areas.</p> <p>At St Pancras we have approach release for the call-on routes but these are into terminus platforms at 40kph.</p> <p>On Ebbsfleet high level, the routes into Church Path Pit sidings were considered, but again they fall out of the</p>

		<p>requirements as they are shunt routes and on a 80kph (50mph) line which is outside scope.</p> <p>Considering the above, I don't believe that we have any data to add for this particular report.</p>
Nick Adams	LNW Manchester Outer	None on the Outer Manchester area.
Andrew Thexton	LNE Middlesbrough	<p>For the Middlesbrough area we have one alpha numeric theatre board that is approach lit at Saltburn West Junction. It is on L215 signal and it will show a "1", "2", "B" or "S". It is only approach lit for "B" or "S".</p> <p>It is not a high speed line, line speed is 40 mph. It is 14 chains from the points. There are regular light engine moves at the location.</p> <p>We also have a theatre board at G265 GPL at Grangetown Junction capable of displaying a "B" or "M" however this is not approach lit.</p>
Ashley Jackson	EM Lincoln	Not aware of any on my area.
Robert Alexander	Scotland West	4 locations identified
Andrew Frost	West Anglia Outer	There are none on the west Anglia outer area.
Martin Rose	LNW South	109 signals identified

Appendix F – Network Rail Didcot closure statement

28. Network Rail provided a closure statement on 9 April 2019. They stated in summary the following:

Network Rail undertakes its signalling risk assessment on a 5-year cycle. In 2018, it became apparent that some of the Routes were significantly behind in their assessments. This was complicated by the fact that SORAT was unable to generate an accurate, analytical report of signals that had overdue assessments. In response, SIN181 was issued by the Professional Head of Signalling. The Special Inspection Notice (SIN) was issued to identify the number of plain line signals requiring steady state Signalling Overrun Risk Assessment (SORA) and the type of assessment required. All Routes have completed their gap analysis and made their return, with the exception of Wales (will be submitted week commencing 28th January) 2019. Each Route has developed an action plan and/or identified a contractor who will undertake their assessments in CP6. A new reporting functionality has been developed in SO RAT, it has gone through testing (including factory acceptance test) and was launched on 1st April 2019. This will ensure that the Head of Risk, Assurance & Investigations and the SORAT Steering Group have the means to more accurately monitor and report on how the Routes are complying with their action plan. The SORAT overdue assessments will also be reported through the SHEP report.